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TRANSMITTAL FORM

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Total Number of Pages in This Submission

Application Number	10/775,408
Filing Date	February 10, 2004
First Named Inventor	K.C. Chiam
Art Unit	3743
Examiner Name	Lewis, Aaron J.
Attorney Docket Number	640P002

ENCLOSURES (Check all that apply)

<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input checked="" type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Reply to Missing Parts/ Incomplete Application <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): -Claim of Priority Transmittal Letter -Certified copy of Singapore Patent Appln. No. 200307837-5 filed 12/31/03
<div>Remarks</div>		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Niels & Lemack		
Signature			
Printed name	Kevin S. Lemack		
Date	July 15, 2005	Reg. No.	32,579

CERTIFICATE OF TRANSMISSION/MAILING

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Signature			
Typed or printed name	Kevin S. Lemack	Date	July 15, 2005

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : K.C. Chiam
Serial No. : 10/775,408
Filed : February 10, 2004
For : RESPIRATORY MASK WITH INSERTED SPACER
Examiner : Lewis, Aaron J.
Art Unit : 3743
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Confirmation No. : 8878
Attorney Docket No. : 640P002

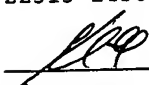
Commissioner for Patents
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Sir:

CLAIM OF PRIORITY

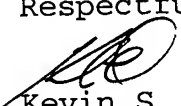
Applicants hereby claim priority of their Singapore Patent Application, Application No: **200307837-5** filed **December 31, 2003**.

A certified copy of the said Singapore Patent Application as filed in Singapore is enclosed herewith.

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Signature: **Kevin S. Lemack**
Date: July 15, 2005

Respectfully submitted,


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**REGISTRY OF PATENTS
SINGAPORE**

This is to certify that the annexed is a true copy of application as filed for the following Singapore patent application.

Date of Filing : 31 DECEMBER 2003

Application Number : 200307837-5

Applicant(s) /
Proprietor(s) of Patent : K. C. CHIAM.

Title of Invention : RESPIRATORY MASK WITH INSERTED
SPACER.



SHARMAINE WU (Ms)

Assistant Registrar
for REGISTRAR OF PATENTS

**CERTIFIED COPY OF
PRIORITY DOCUMENT**

PF1

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Priority : Normal

Classification : Confidential

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Number of Applicants

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Country or Country Designated :

File number :

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Inventor

Applicants are inventors : No

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Claiming an earlier filing date under

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Section 14 4 c Requirements

The invention has been displayed at an international exhibition : No

Section 114 Requirements

The invention relates to and or used a microorganism deposited for the purposes of
disclosure in accordance with section 114 with depository authority under the Budapest Treaty : No

Checklist (A) The application consists of the following number of sheets

Request :

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Description with Claims : 10

Drawings : 9

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Patents Form 26 is or will be furnished

Patents Form 26 is or will be furnished :

Printed : 03-May-2004

TITLE OF THE INVENTION

RESPIRATORY MASK WITH INSERTED SPACER

5 BACKGROUND

Field of the Invention

10 This invention relates to respiratory or face mask with improved breathability and wearability.

Description of Related art

15 Many types of respiratory face masks have been patented. A major problem facing the respiratory or face mask is the accumulation of carbon dioxide in the mask chamber. This accumulation, if not effectively discharged from the mask can be dangerous for the wearer.

20 Various methods have then been proposed to overcome the problem. The use of a discharge valve may help in discharging the exhaled gas given out by the wearer but it also discharges other contaminants carried by the wearer into the surrounding. Some other improved respiratory masks are costly to manufacture. A low cost respiratory face mask with improved breathability is desired.

25 The present invention obviates the need for a valve and employs the existing filter layers in the mask and introduces a spacer to address this issue.

Problem to be solved by the Invention

30 It is an object of the invention to manufacture a respiratory mask that:

- 35 1) conforms to N95 performance and other high performance standards in air permeability to improve air circulation in the mask chamber to achieve maximum air circulation in the mask.

Consequently, the mask provides greater safety and comfort to the wearer, while protecting other people from the contaminants exhaled by the wearer and vice versa;

5

2) provides visual check on the choking of the mask. The choke arises when the filter material trapped more particulates over time. For all currently available masks, it is difficult to check on the choke visually.

10

3) prolongs donning time.

4) has relatively low manufacturing costs.

15

DESCRIPTION OF THE INVENTION

A respiratory mask of the current invention covers the nose and mouth of a person. A spacer is inserted in the mask body to create space in between different filter layers on the mask body so that when exhaled air of the wearer is discharged, the gaps in the filter layers created by the spacers together with the filter layers provide a pumping effect mechanism to blow out extra carbon dioxide.

25 The spacers configures the mask such that during exhalation the individual filter layers are puffed up more apparently to the eyes. A visual indication to change the mask would be when the puff shape increases by roughly fifty percent.

30 The spacer also acts to separate the filter layers enhancing the ventilation of the moisture produced by the wearer and thus prolongs the donning of the mask.

35

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a person wearing a respiratory facemask with line spacers on the top side of the mask.

5

Figure 2 shows a respiratory mask of the invention.

Figure 3a shows the layers of a respiratory mask of the invention.

10 Figure 3b shows a cross sectional view of the line spacer of the invention.

Figure 4a shows the layers of a respiratory mask of the invention with another embodiment of the invention.

15

Figure 4b shows a cross section view of the layers of a respiratory mask of the embodiment discussed in Fig. 4a.

Figure 5 shows the layers of a respiratory mask of another embodiment.

20

Figure 6a shows the layers of a respiratory mask of the invention with another embodiment of the invention.

25 Figure 6b shows a cross section view of the layers of a respiratory mask of the embodiment discussed in Fig. 6a.

Figure 7 shows the various shapes of the spacer of the invention.

30 Figure 8a shows the another embodiment of the invention using folded filter spacers in the layers of a respiratory mask of the invention.

Figure 8b shows the folds on the filter layer of the embodiment discussed in Figure 8a.

35

Figure 9a shows a three-piece respiratory mask with inserted line spacers.

5 Figure 9b shows a cup-shaped respiratory mask with inserted line spacers.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

10 Embodiments of the present invention will now be described with reference to the accompanying drawings.

The respiratory mask should conform to N95 performance and other high performance standards in air permeability to improve air circulation in the mask chamber so as to achieve maximum air circulation in the mask. The
15 respiratory mask has a mask body and a headband for putting on the respiratory mask to the face of a wearer. The mask body has a few filter layers, which is constructed as follows:-

20 an inside mask having two or more filter layers;
an outside mask having two or more filter layers;
one or more spacers inserted between the filter layers of the inside
mask to generate space between different filter layers of the inside
25 mask; and
one or more spacers inserted between the filter layers of the outside
mask to generate space between different filter layers of the outside
mask

30 so that when air is discharged by the wearer, the spacers together with the filter layers provide a pumping effect mechanism to blow out more carbon dioxide given off by the wearer to the surrounding and to take in more air from the surrounding for the wearer.

35

Referring to Figure 1, this shows a person wearing a respiratory facemask with line spacers on the top side of the mask.

5 Referring to Figure 2, this shows a respiratory mask of the invention, with the outside mask, inside mask, head band, foam lining and neck curtain.

10 Figure 3a, 3b, 4a, 4b, 5, 6a, 6b, 7, 8a, 8b, 9a and 9b are various embodiments of the invention. There are a few configurations the spacer can be inserted within the mask's filter layers to achieve the same pumping effect in discharging carbon dioxide and are describe below.

15 Figure 3a and 3b shows two parallel flexible round cross section line spacers are inserted between the filter layers 2 and 3 and between filter layers 3 and 4 to create space between the said layers. The cross section of the line spacers can also be rectangle or square.

20 Figure 4a and 4b shows two parallel flexible round cross section line spacers are inserted in perpendicular direction to that described in Figure 3. The line spacers are also inserted between the filter layers 2 and 3, and between filter layers 3 and 4.

25 Figure 5 and 6 shows that alternatively, a spacer of certain geometrical shape can also be inserted between filter layers 2 and 3. In Figure 6, the spacer is a concentric ring with tapered inner hole.

30 Figure 7 shows the other shapes of spacers proposed, Other geometrical shapes of spacers that can be inserted in filter layer 2 and 3 to serve the same functions are the offset tapered concentric ring, square frame, diamond frame and elliptical.

35 Spacing configuration can also be achieved by folding the filter layers 2 and 3 in the cross sectional shape of a dovetail running in parallel across the mask as shown in Figure 8. The dovetail folded layer can be on one, two, three or on all the layers.

The spacers configuration, the foam lining seal and the neck curtain describe above can be implemented on other shape of masks as shown in Figure 9.

5

The line spacers can also be installed with the combination of horizontal parallel lines and vertical parallel lines, also as shown in Figure 9a and 9b.

The line spacers can be inserted in just between filter layers 1 and 2, or filter
10 layers 2 and 3, or filter layers 3 and 4, or in all layers or in some layers.

Additionally, if desired, both the top and bottom side of the mask can be inserted with either configuration of spacers as described above to improve performance in discharge of exhaled air.

15

The spacer or spacers, has the added function of acting as a semi-rigid supporting frame to prevent the mask from collapsing during inhalation.

The respiratory mask comes with foam lining on the opening of the mask as
20 shown in Figure 2. The foam lining provides air tight sealing to prevent any discharge of contaminant from getting out or into the mask.

A neck curtain is also added to the mask to cover the neck of the wearer as shown in Figure 1 to prevent the bacteria from penetrating into the mask for
25 wearers who have voluminous, thick and stiff beard.

The spacers when filled with exhaled air shapes the respiratory mask in such a manner that after prolonged periods of use, and when more exhaled air remains within the spacers, the individual filter layers puff up. It then becomes very apparent to the others and to the wearer (upon
30 a quick check with a mirror). Thus, the pumped up spacers serves as a visual guide to the wearability of the respiratory mask. A visual indication to change the mask would be when the puffed up shape of the respiratory mask increases by approximately fifty percent.

35

Tests have been conducted and these tests showed that the respiratory mask of the subject invention offers improved breathability by improved discharge of exhaled air and improved taking in of air from the surrounding.

Having described preferred embodiments of the invention with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention as defined in the appended claims.

ADVANTAGEOUS EFFECTS OF THE INVENTION

The respiratory mask of the subject invention provides greater safety and comfort to the wearer, while protecting other people from the contaminants exhaled by the wearer and vice versa. It further provides a visual check on the choking of the mask, a feature which currently available masks do not have. With these new features, donning time of the respiratory mask is extended, thereby reducing costs to the institutions using such respiratory masks.

CLAIMS

1. A respiratory mask that conforms to N95 performance and other high performance standards in air permeability for improved air circulation, the
5 respiratory mask having a mask body and a headband for putting on the respiratory mask to the face of a wearer, the mask body consisting of :-
- an inside mask;
- 10 an outside mask,
- the inside mask having two or more filter layers;
- 15 the outside mask having two or more filter layers;
- one or more spacers inserted between the filter layers of the inside mask to generate space between different filter layers of the inside mask; and
- 20 one or more spacers inserted between the filter layers of the outside mask to generate space between different filter layers of the outside mask
- 25 so that when air is discharged by the wearer, the spacers together with the filter layers provide a pumping effect mechanism to blow out more carbon dioxide given off by the wearer to the surrounding and to take in more air from the surrounding for the wearer.
- 30 2. A respiratory mask with claimed in claim 1 wherein after a prolonged period of use of the respiratory mask by the wearer, and there is insufficient exchange of exhaled air with the air from the surrounding, the spacer enables the puffing up of the mask, thereby increasing the size of the respiratory mask so as to provide a visual
35 check on the choking of the mask of the wearer.

3. A respiratory mask as claimed in claim 1 wherein the spacer acts as a semi-rigid supporting frame to prevent the respiratory mask from collapsing during inhalation.
- 5
4. A respiratory mask as claimed in claim 1 wherein the spacer is of round cross section.
5. A respiratory mask as claimed in claim 1 wherein the spacer is of rectangular cross section.
- 10
6. A respiratory mask as claimed in claim 1 wherein the spacer is of square cross section.
7. A respiratory mask as claimed in claim 1 wherein the spacer is a offset tapered concentric ring.
- 15
8. A respiratory mask as claimed in claim 1 wherein the spacer is a offset or non-offset tapered square frame.
- 20
9. A respiratory mask as claimed in claim 1 wherein the spacer is a offset or non-offset tapered diamond frame.
10. A respiratory mask as claimed in claim 1 wherein the spacer is a offset or non-offset tapered elliptical frame.
- 25
11. A respiratory mask as claimed in claim 1 wherein the spacer is made by folding two filter layers in the cross sectional shape of a dovetail running in parallel across the mask body, either horizontally or vertically or both horizontally and vertically in combination.
- 30
12. A respiratory mask as claimed in claim 1 wherein the respiratory mask has a foam lining on the opening of the respiratory mask to provide air tight sealing to prevent any discharge of contaminants from getting out or into the respiratory mask.
- 35

13. A respiratory mask as claimed in claim 1 wherein the respiratory
mask has a neck curtain to cover the neck of the wearer with voluminous,
5 thick and stiff beard.

10

15

20

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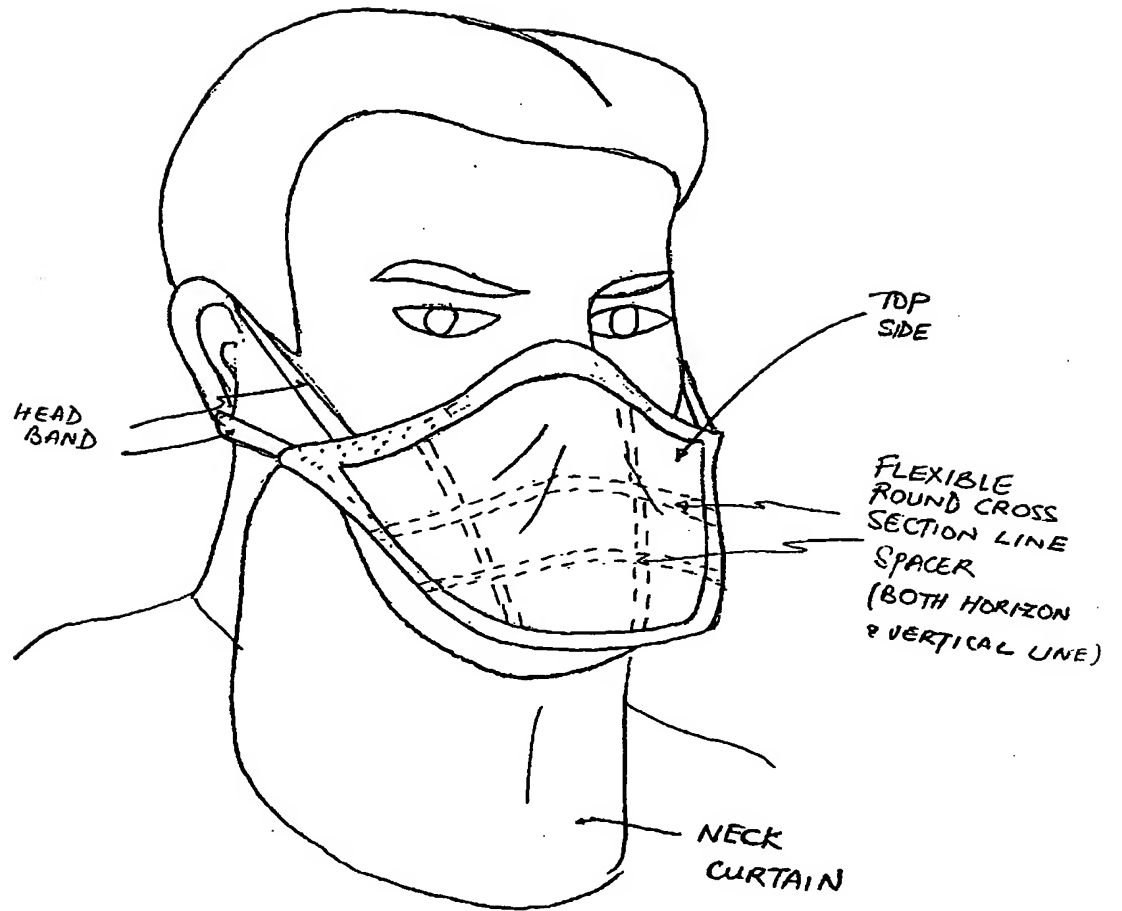


FIG 1 RESPIRATORY MASK
WITH LINE SPACER

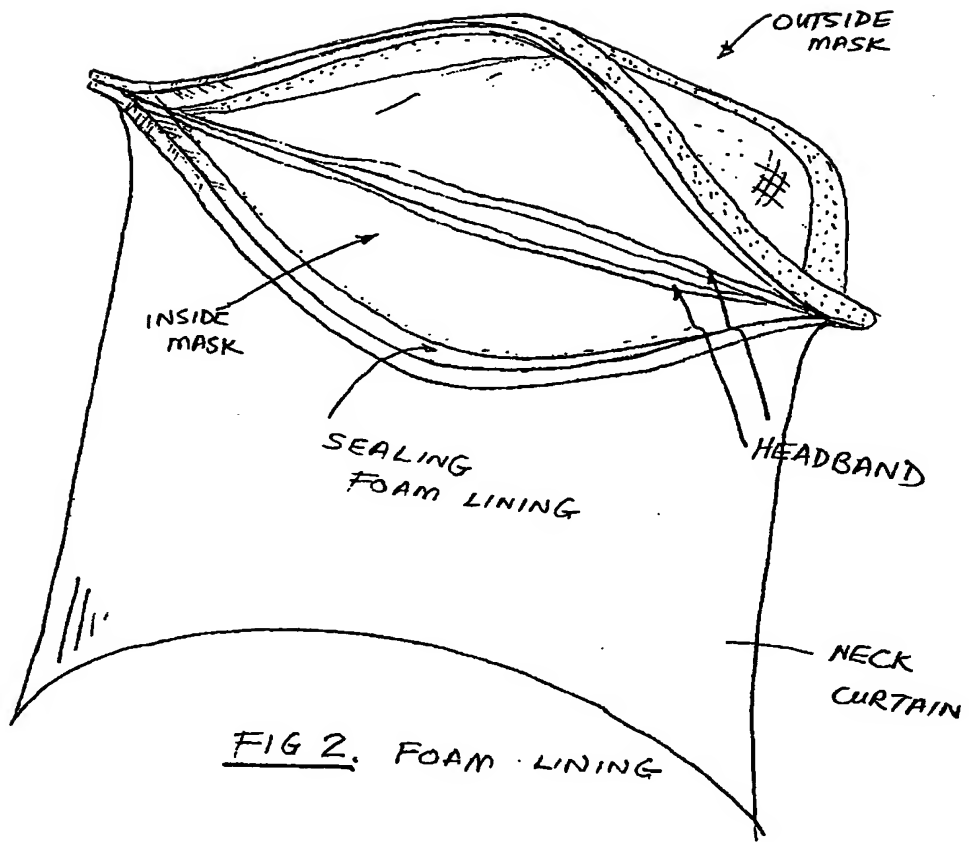


FIG 2. FOAM LINING

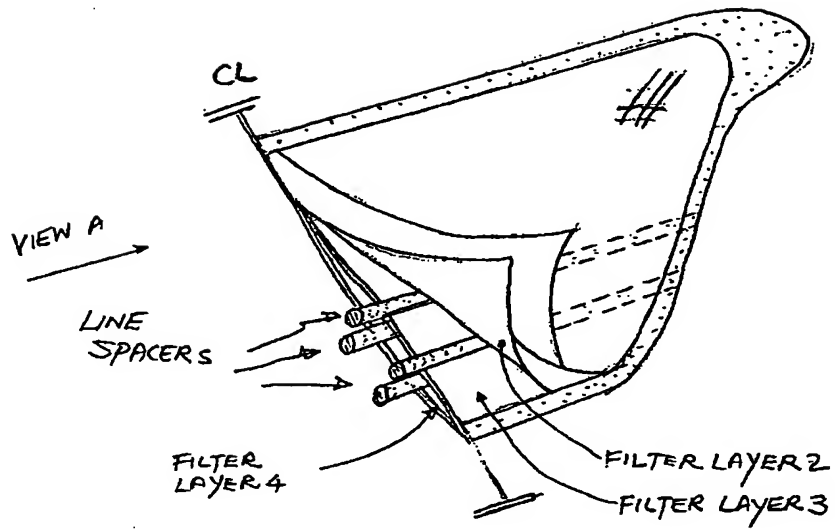


FIG 3a. PARALLEL FLEXIBLE
ROUND CROSS-SECTION LINE
SPACER

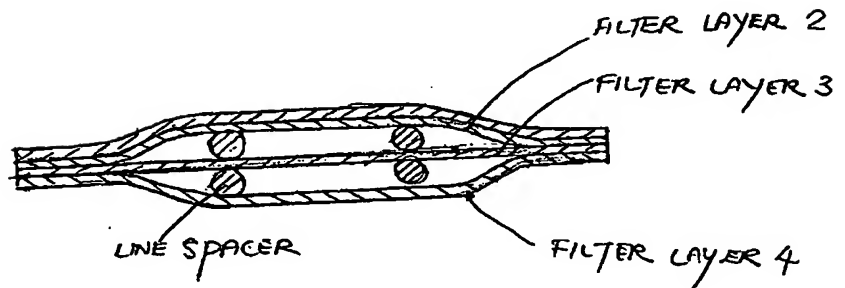


FIG 3b. CROSS-SECTIONAL VIEW OF
LINE SPACER

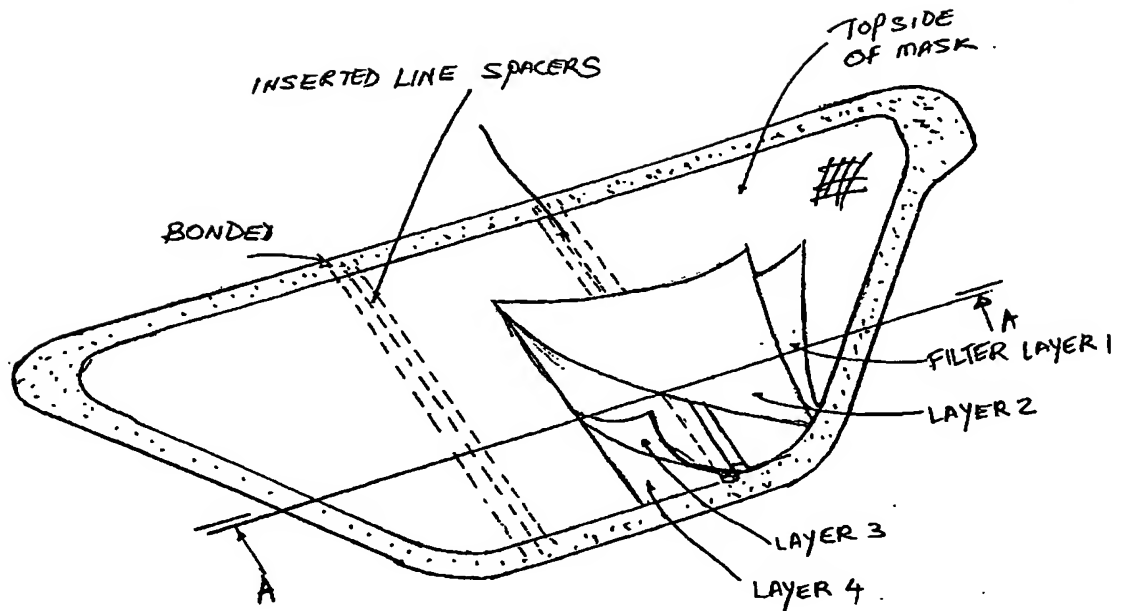


FIG 4a. FLEXIBLE ROUND CROSS SECTION
LINE SPACER ALIGNED VERTICALLY

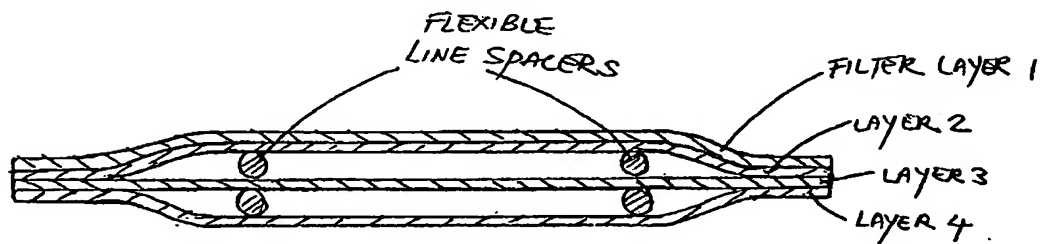


FIG 4b VIEW A

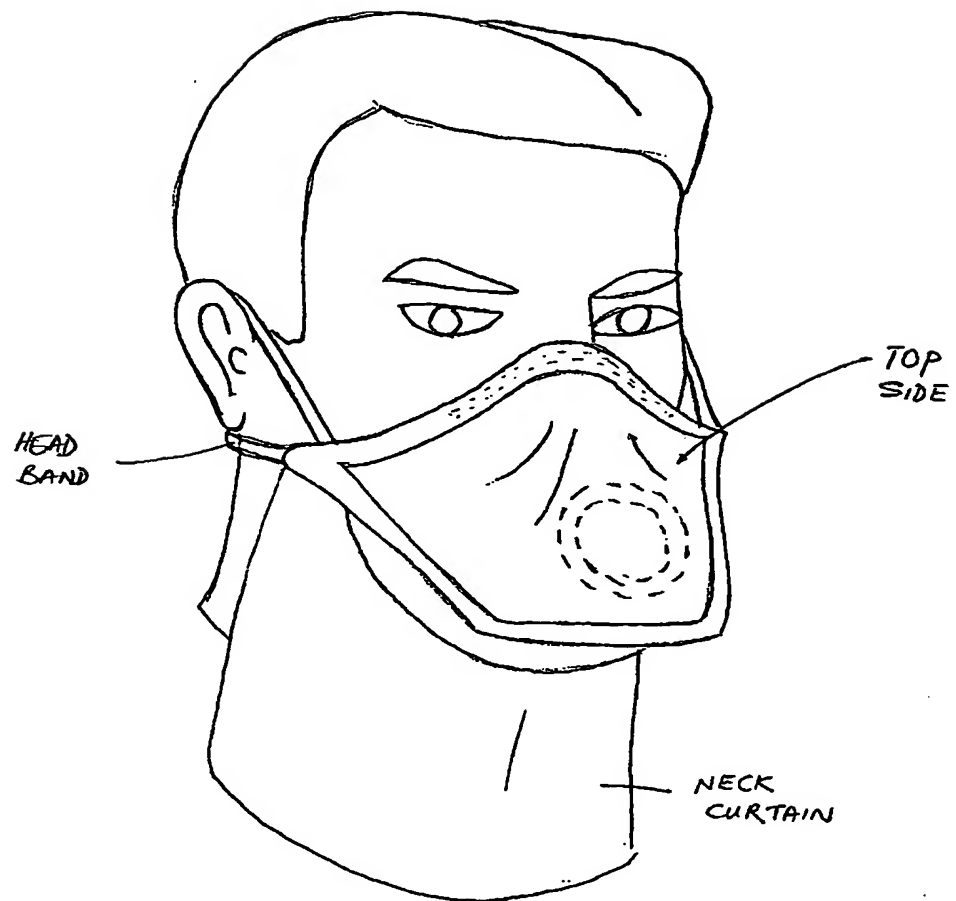


FIG 5. RESPIRATORY MASK
WITH GEOMETRICAL SHAPE
SPACER (ABOVE SHOWS
THE TAPERED CONCENTRIC RING AS
A SPECIAL CASE)

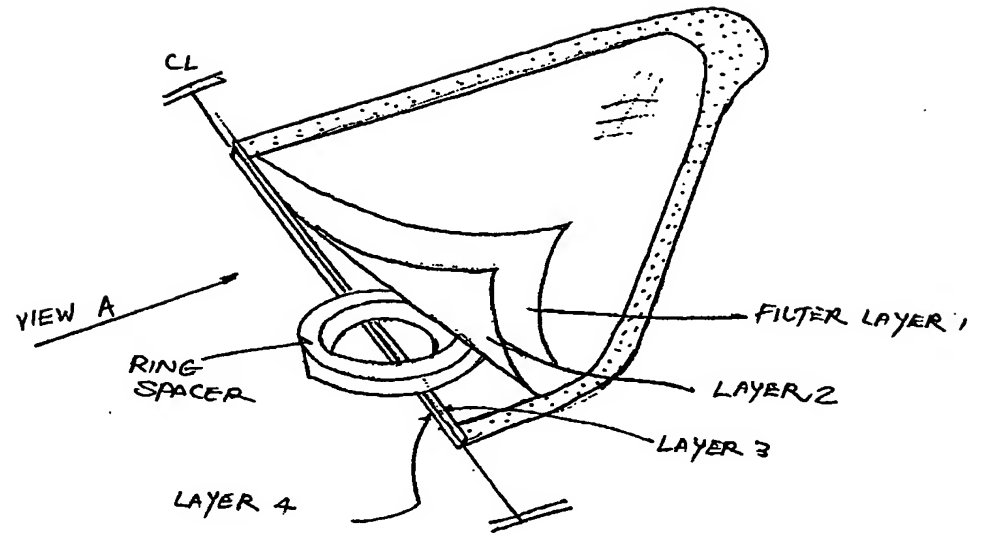


FIG 6 TOP SIDE HALF-PORTION OF THE MASK SHOWING THE GEOMETRICAL SPACER

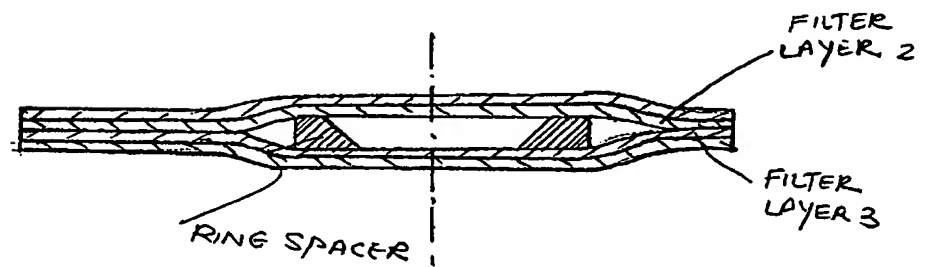
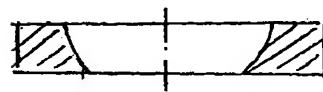
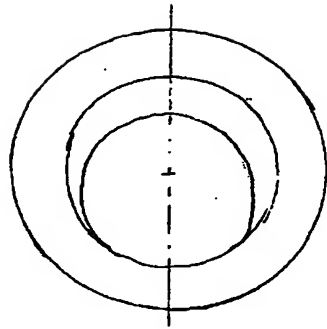
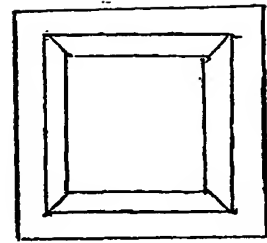


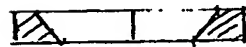
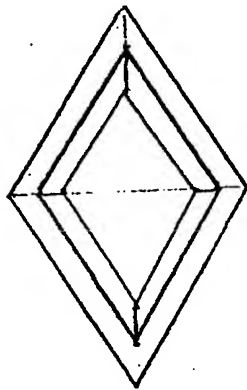
FIG 6 VIEW A



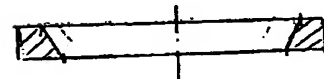
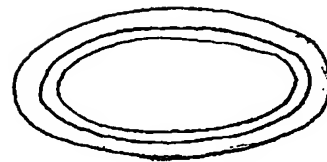
a. TAPERED RING WITH
OFFSET INNER HOLE



b. RECTANGLE FRAME
SPACER



c. DIAMOND/RHOMBUS
FRAME SPACER.



d. ELLIPTICAL SHAPE
SPACER

FIG 7. ALTERNATE GEOMETRICAL
SPACER SHAPES

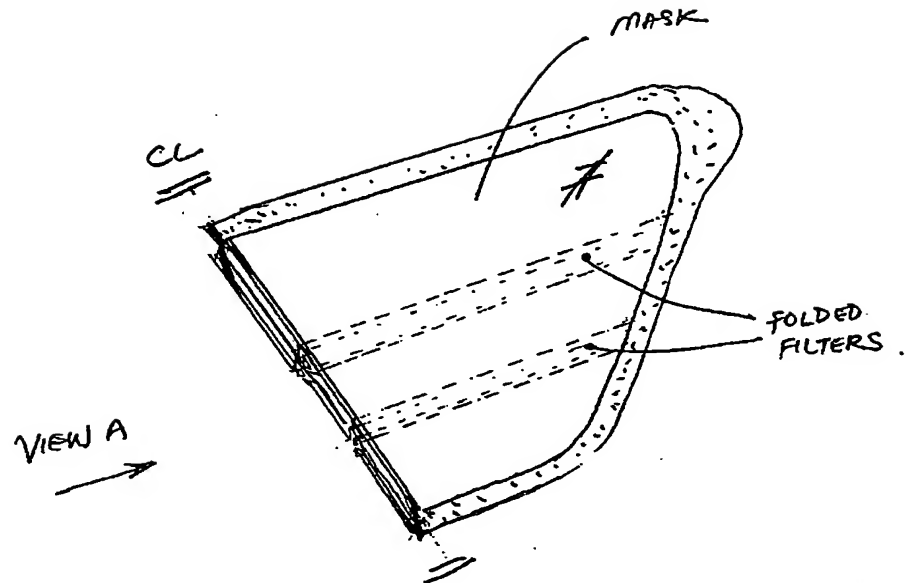


FIG 8a. TOPSIDE HALF PORTION OF THE MASK SHOWING THE FOLDED FILTER SPACER.

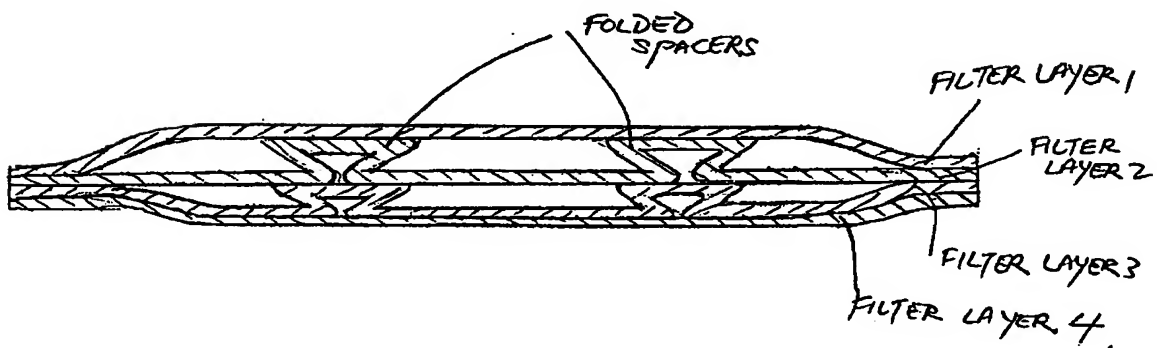


FIG 8b. VIEW A OF THE FOLDS ON THE FILTER LAYER 2 AND 3 TO CREATE SPACING.

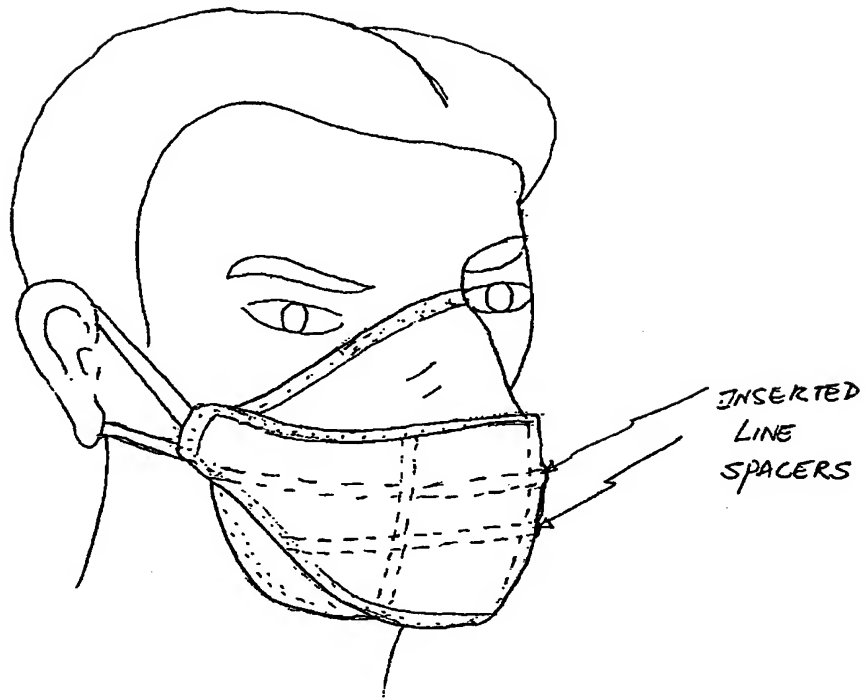


FIG 9a. THREE-PIECE MASK WITH INSERTED SPACERS

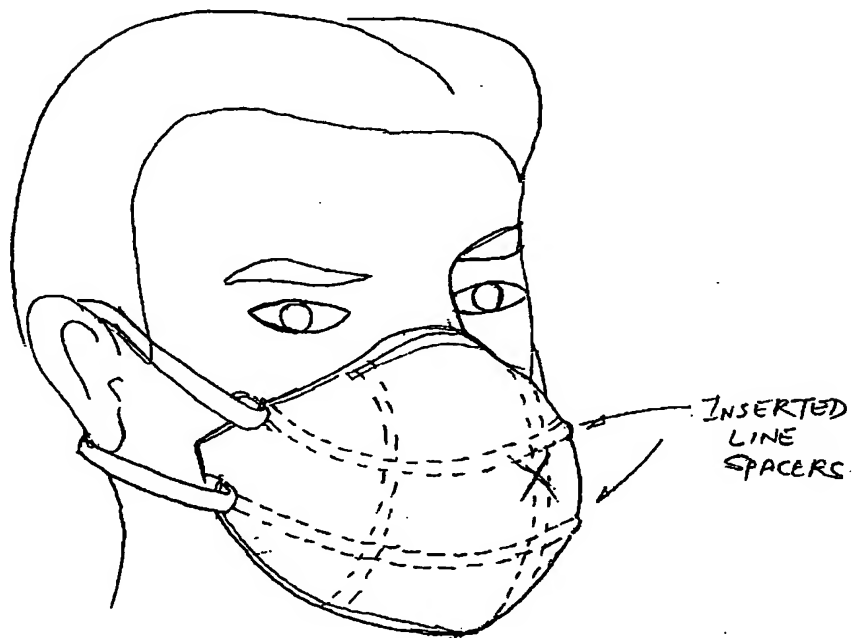


FIG 9b. CUP SHAPED MASK WITH INSERTED SPACERS

ABSTRACT

RESPIRATORY MASK WITH INSERTED SPACER

5

A respiratory mask that conforms to N95 performance and other high performance standards with improved air permeability for improved air circulation. The respiratory mask has a mask body and a headband for putting on the respiratory mask to the face of a wearer, the mask body consisting of an inside mask having two or more filter layers; an outside mask, having two or more filter layers; one or more spacers inserted between the filter layers of the inside mask to generate space between different filter layers of the inside mask; and one or more spacers inserted between the filter layers of the outside mask to generate space between different filter layers of the outside mask so that when air is discharged by the wearer, the spacers together with the filter layers provide a pumping effect mechanism to blow out more carbon dioxide given off by the wearer to the surrounding and to take in more air from the surrounding for the wearer.

Various forms and shapes of the spacer have been proposed.

25 Figure 3a